UNITED NATIONS

ST

Secretariat

Distr.
GENERAL

ST/SG/AC.10/C.3/20/Add.2
1 August 1995

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Original : ENGLISH

COMMITTEE OF EXPERTS ON THE TRANSPORT OF DANGEROUS GOODS

Sub-Committee of Experts on the Transport of Dangerous Goods

REPORT OF THE SUB-COMMITTEE OF EXPERTS ON ITS TENTH SESSION (Geneva 10 - 20 July 1995)

Addendum 2

REPORTS OF THE WORKING GROUPS ON THE HARMONIZATION OF CLASSIFICATION CRITERIA

(see ST/SG/AC.10/C.3/20, paras. 164 to 167)

Part I - Report of the Working Group on Harmonization of classification criteria for Reactive Substances

Part II - Report of the Working Group on Harmonization of classification criteria for Flammable Substances

Note by the secretariat: These working groups were convened in the context of cooperation with the International Labour Office (ILO), the Inter-Organization Programme on Sound Management

of Chemicals (IOMC) and follow-up to the United Nations Conference on Environment and Development (UNCED) (Agenda 21, Chapter 19, Programme Area B).

GE.95-23228

Part I - Report of the Working Group on Harmonization of Classification Criteria for Reactive Substances

(ILO Headquarters, Geneva, 12-14 July 1995)

GENERAL

1. The Working Group on Harmonization of Classification Criteria for Reactive Substances met at ILO Headquarters from 12 to 14 July 1995 under the chairmanship of Mr. R. Woodward (United Kingdom). Mr. I. Obadia (ILO) served as rapporteur. In addition, 28 experts from Canada, France, Italy, Germany, the Netherlands, Norway, Sweden, United Kingdom, United States and representatives of the European Commission (EC), the European Chemical Industry Council (CEFIC) and the Hazardous Material Advisory Council (HMAC) took part in the meeting. The Working Group agreed that the paper "Implementation of Agenda 21 - Harmonized classification of reactive materials" (ST/SG/AC.10/C.3/R.610), prepared by the expert from the United Kingdom, would serve as the basis for discussion. Experts were expected to state, to the extent possible, nationally coordinated positions when discussing issues and proposals made in the paper (referred to as R.610 further below).

2. It was agreed that the remit of the Working Group was to evaluate the extent to which the Recommendations on the Transport of Dangerous Goods (UN RTDG) definitions, test methods and classification criteria were suitable for inclusion in a harmonized system and to identify divergences requiring significant changes to existing systems to achieve harmonization as far as is possible. The Working Group agreed that, unless needed for specific reasons, the parts of the paper dealing with "Consequences of harmonization" should be best discussed at later meetings of the Working Group, after defining a harmonized system for physical hazards.

3. The following issues and points to keep in mind during the discussion were raised during the preliminary general discussion: the need to keep in mind potential cost impact of eventual changes; the need for a stepwise approach; the need to discuss separately special groups of substances; the fact that a harmonized system is aimed at transport, employment, use and consumer protection; the need to coordinate the work of the Working Group with the other experts dealing with the issues of hazard communication, particularly labelling.

NOTE ON PRESENTATION OF CONCLUSIONS

4. The conclusions of the Working Group are presented following the layout of the United Kingdom discussion paper. Debate between the experts is not reported. For each hazard category, the text of relevant recommendation being the object of discussion is not reproduced but is identified by its numbering in the discussion.

PART 1. EXPLOSIVE SUBSTANCES

Definitions: Recommendation 8. f)

5. The UN RTDG definitions as in 8. a) i), ii) and iii) should be used by the harmonized system and the following explanatory notes should be added :

> "for i) "this definition covers explosive substances regardless the purpose for which they are manufactured. The reference to pyrotechnic substances is important as it gives a classification system the opportunity not to subject both intentional explosives and pyrotechnics to the testing scheme for evaluation of explosive properties; ii) defines what a pyrotechnic substance is; iii) is necessary for the practical purpose of classification and regulations following the classification."

Test methods Recommendations 9. d), e), f), g)

6. The expert from Germany suggested, instead of recommendation 9. f), to use UN Test Series 2 methods and criteria for the evaluation of the property "explosive". The Working Group agreed that testing in this context should concentrate on unintentional explosives only. The Working Group carried recommendations 9. d) and e) and felt that 9.g) required further consideration.

7. The Working Group agreed to a proposal by the expert from Germany to prepare for the next meeting a more elaborate paper on explosive substances based on discussion and further consultations with the other experts in the Working Group.

8. The Working Group endorsed **Recommendation 11. j)** related to consequences of harmonization and accepted an offer by CEFIC to prepare a paper covering the subject of screening procedures for each of the hazard categories in R.610 needing one.

Classification criteria **Recommendations 10. d), e).**

9. The Working Group agreed that the criteria should be revisited in the context of redrafting Part 1- Explosive Substances of the discussion paper (R.610). It was agreed that the two papers from the expert from Germany and CEFIC mentioned in paras. 7 and 8 would be presented as official documents for the next session and that R.610 would be revised by the expert of the United Kingdom.

PART 2. ORGANIC PEROXIDES

Definitions Recommendation 12 c)

10. The Working Group agreed that the first part of the text under 5.2. of the UN RTDG was an acceptable basis for a harmonized system. Paragraph 12. b) of R.610 was amended by replacing in the third line, the word "but" by the word "and" to avoid confusion in relation to explosive properties.

11. The Working Group recognized that organic peroxides could not be regarded as oxidizing substances. This pointed out to an inconsistency in the European Commission (EC) classification. It was agreed that member States of the European Union (EU) should approach the European Commission with a view to separate organic peroxides from oxidizers in the EU scheme. This would resolve the differences between the UN and EC systems and achieve harmonization. A proposal to treat organic peroxides together with self-reactive substances did not receive sufficient support.

Test methods Recommendation 13. c)

12. The Working Group carried this recommendation unanimously. The UN test regime was the only one in practice and was suitable for inclusion in a harmonized system. It was also

recognized that, under EU rules, the risk phrases R2 and R3 were applicable to Type B and C tests, in addition to Type A.

Classification criteria **Recommendations 14. b) and g)**

13. Recommendation 14. b) was carried after being amended to replace in the third and fourth lines the words "of organic peroxides" by the words "other than oxidizing substances".

14. The Working Group noted that the basis for the UN (performance oriented) and EC (concentration oriented) criteria for exclusion from organic peroxide classification, differed significantly and that paragraph 14. e) of R.610 needed clarification. The Working Group requested the authors of R.610 to revisit the issue related to recommendation 14 g) and to provide additional technical information relative to cut-off points and to include the results in the expected revised version of the paper. The Working Group recognized also that there would be implications in relation to labelling requirements.

PART 3. OXIDIZING SUBSTANCES

Definitions (solids & liquids) **Recommendation 16 c)**

15. The Working Group agreed that the definition of oxidizing substances should be harmonized on the UN RTDG version. It was noted by the expert from Germany that the reference to exothermic reaction in the EC definition was misleading and should be reconsidered.

SOLIDS

Test methods **Recommendation 17 e)**

16. The recommendation 17 e) was carried by the Working Group.

Classification criteria **Recommendations 18. c)**

17. The recommendations 18. c) were carried by the Working Group. CEFIC would include an outline for a screening procedure in its paper. It was agreed that the issue raised in 19 c)

concerning consequences of harmonization in relation to specific substances such as ammonium nitrate should be dealt with at a later stage.

LIQUIDS

Test methods Recommendation 20. c)

18. The Working Group carried recommendation 20 c) as an acceptable harmonized position. Paragraph 20 a) was amended by replacing the words "is heated with cellulose" by the words "and cellulose is ignited".

Classification criteria Recommendation 21. c)

19. Recommendation 21 c) was carried by the Working Group. It noted that there might be some compatibility between EU R8 and R9 phrases with relevant UN Packing Groups.

GASES

Definitions

20. There was no numbered recommendation in R.610. However it was agreed that the UN definition should be the basis for a harmonized system. The authors agreed to include the recommendation in the revised R.610.

Test methods

21. There was no numbered recommendation in R.610. The authors proposed a calculation method along the lines of ISO 10156. The Working Group agreed that this could be a basis for harmonization.

Classification criteria Recommendation 25. c)

22. Recommendation 25 c) was carried by the Working Group.

PART 4. PYROPHORIC SUBSTANCES

Definitions Recommendation 27. e)

23. The Working Group agreed that pyrophoric substances should be looked at in conjunction with self heating substances as regard definitions. It was agreed that the UN definition in 27. a) needed to be explained and amplified by additional wording related to quantity and time. The following text, based on wording in the Manual of Tests and Criteria, and prepared by a small working party, was proposed for consideration and accepted as a basis for harmonization:

> "Pyrophoric substances are substances which, even in small quantities, are liable to ignite within a short period of time after coming into contact with air."

24. The authors were requested to revise paragraphs 27 a) and e) in R.610 accordingly.

Test methods Recommendation 28 d)

25. The recommendation was carried by the Working Group.

Classification criteria Recommendation 29. c)

26. The recommendation was carried by the Working Group.

PART 5. SELF-HEATING SUBSTANCES

Definitions Recommendation 31 e)

27. As for pyrophorics, the UN definition was not found to be sufficient and the Working Group endorsed the following additional text for clarification based on the Manual of Tests and Criteria and as proposed by the working party:

> "Self-heating substances are substances other than pyrophoric substances which, in contact with air without energy supply are liable to self-heating. These substances will ignite only when in large amounts and after long periods of time."

28. The authors of R.610 agreed to make the necessary revisions to reflect the decision.

Test methods Recommendations 32 d) and e)

29. The recommendations were carried by the Working Group. It was also agreed that the CEFIC paper on screening procedures should also cover self-heating substances.

Classification criteria Recommendations 33 c) and d)

30. The recommendations were carried by the Working Group. It was agreed that paragraph 33. a) should be amended by inserting in the 8th line, after the words "Class 4.2. and", the word "either".

PART 6. SELF-REACTIVE SUBSTANCES

31. The Working Group agreed that this issue was very complex. The expert from the United Kingdom agreed to rewrite the section of Part 6 related to self-reactive substances in the light of the discussion and to table it at the next meeting. It was agreed that, for the time being, substances related to self-reactive substances and desensitized explosives should be looked at separately from self-reactive substances.

32. The Working Group agreed that the UN scheme was appropriate as a basis for harmonization. It was also agreed that a formal proposal concerning other related issues would need to be put forward to the Sub-Committee of Experts on the Transport of dangerous Goods after due consideration. The expert from the United States indicated that he would bring a proposal on substances related to self reactive substances for consideration by the Sub-Committee during its December 1995 session.

PART 7. SUBSTANCES WHICH REACT WITH WATER GIVING OFF FLAMMABLE GASES

Definitions Recommendation 39. c)

33. The Working Group agreed to wait until a United States proposal on this issue is made to the Sub-Committee and discussions on flammable gases have taken place before reconsidering definitions. Consideration should be given to labelling issues in this regard and to toxic gases.

Test methods Recommendation 40. b)

34. It was agreed that recommendation 40. b) be carried, but that it should be amended to refer to the need for additional wording in UN Test N.5 related to quantity of test material, volume of water, different time intervals for measuring rapid gas generation, the solubility of gases in water and the problem of toxic gases which are not flammable. The expert from the United Kingdom agreed to modify 40. b) accordingly.

Classification criteria

35. No specific recommendation was proposed under this item. The Working Group agreed that there was no need for further work on this aspect.

KEY ITEMS FOR CONSIDERATION AT THE NEXT SESSION OF THE WORKING GROUP

36. The Working Group agreed that the discussion on explosives would need to continue at the next meeting. Papers for consideration at the December meeting of the Working Group included a revised version of R.610 by the U.K, a document by Germany on tests and criteria for unintentional explosives, and a document by CEFIC on screening procedures. These documents should be received by the secretariat by 22 September 1995 at the latest. It was felt by some experts that the two Working Group on reactive and flammable substances should be brought together at some point in the process to ensure coherence of the overall proposal on physical hazards. It was agreed that in view of the progress made, the next session of the Working Group could be shorter.

Part II - Report of the Working Group on Harmonization of Classification Criteria for Flammable Substances (Palais des Nations, Geneva, 17-18 July 1995)

GENERAL

1. A session of the Working Group on Harmonization of Classification Criteria for Flammable Substances was held on 17-18 July during the tenth session of the Sub-Committee of Experts under the chairmanship of Mr. G. Oberreuter (Germany). Various experts from all delegations participating at the tenth session of the Sub-Committee attended the meeting.

2. The following documents were considered for discussion:

ST/SG/AC.10/R.493 (ILO)	Report of the Ottawa workshop on the harmonization of the classification of the physical hazards of chemicals
ST/SG/AC.10/C.3/R.617 (Germany)	Harmonized classification criteria for flammable substances
UN/SCETDG/10/INF.16	Criteria for the classification of flammable liquids (discussion paper of the chairman)
ST/SG/AC.10/C.3/R.634 (Germany)	Questionnaire relating to criteria for flammable liquids
ST/SG/AC.10/C.3/R.620 (United States)	Harmonized classification criteria for flammable liquids
UN/SCETDG/10/INF.10 (CEPE)	

The document ST/SG/AC.10/C.3/R.590 (United States) was considered as far as flammability criteria are concerned.

3. In his introductory remarks the chairman recalled the events that had led to the formation of this working group. Together with a working group on reactivity (see Part I of this document) this group was formed to contribute to the implementation of chapter 19 of Agenda 21 with

regard to the harmonization of classification and labelling systems. He recalled also the work done in other organizations such as OECD for toxicity and the work on environmental hazards in a working group in London in May (see ST/SG/AC.10/C.3/R.635).

4. He stressed that harmonization was the overall goal of this group and that it was not solely related to transport but that all existing protection purposes would have to be taken into account. He said all efforts should be made to reach a consensus on the harmonization issues.

5. He stressed also that harmonization would not mean that all harmonized criteria would have to be included in existing regulations but that the criteria included in regulations should be based on the harmonized approach.

6. He proposed that the group should organize the work as follows:

(a) Flammable Liquids

For this area there exist a widespread range of cut-off values and criteria used in different regulations for different protection purposes which need to be harmonized.

(b) Flammable Solids

In this area harmonization could be deemed easier than in area (a) as existing criteria are already harmonized to a certain extent.

(c) Gases and Aerosols

In this area two different systems exist at the moment with a third in preparation.

7. He proposed further, first to agree on the different protection purposes and then to discuss the physical hazards for areas (a) to (c) in order to develop criteria for the definition of hazard levels.

8. The group agreed to the following recommendations for developing a harmonized set of hazard levels and criteria for flammable substances.

PROTECTION PURPOSES

9. The group recalled ST/SG/AC.10/21, paragraph 148:

> "So as to ensure that the final result of this work was in keeping with the requirements of all sectors concerned (transport, employment, use, consumer protection), the experts of the Committee and government observers participating under rule 72 of the rules of procedure were requested to ensure that the representatives who took part in the work were familiar with all applicable legislation in their country in the area concerned, and that they could present a position which had been nationally coordinated in advance."

FLAMMABLE LIQUIDS

10. For this area, the discussion of the group was based on the comparison in ST/SG/AC.10/C.3/R.617 and the sequence of criteria consolidated by the chairman in INF.16 (different criteria and protection purposes used in the major international regulations, presented in tabular form).

Hazard levels

11. The group agreed that the definition of the different hazard levels should be based on flash point cut-off values and that each of the levels should be identified by a written description.

12. The group agreed that four flash point cut-off values (closed cup) should be determined for the definition of hazard levels:

13. [100 °C]

> A cut-off value of 93 °C is currently used in the United States (see also ST/SG/AC.10/C.3/R.620), a cut-off value of 100 °C is used in ADNR/ADN and in Germany for storage purposes.

It was agreed that there was a need to define a hazard level for substances with a flash point higher than 60 °C.
It was agreed that an upper cut-off value for the harmonized approach should not be higher than 100 °C.
It was noted that some regulations (e.g. in Australia), mainly for storage purposes, did not set an upper cut-off value but treated substances with a high flash point according to their ability to burn.

14. 60 °C

This value was agreed for the harmonization of the existing values of 50 °C (United Kingdom), 55 °C (EC), 60 °C (IBC- and BCH-Codes), 60.5 °C (UNRTDG, ICAO TI), 61 °C (RID/ADR, IMDG-Code, ADNR/ADN)).

15. 23 °C

This value harmonizes the existing cut-off values of 21 °C (EC) and 23 °C (UNRTDG, RID/ADR, ICAO TI, IMDG-Code, ADNR/ADN).

16. Lower cut-off value between -18 °C and 0 °C

(a) The cut-off value used in the UNRTDG for the lower level is not a flash point value but a boiling point (35°C). However the use of that criterion may imply that there is an implicit correlation between an initial boiling point lower than 35°C and a flash point. The group felt that further information was necessary to establish a correlation between initial boiling point and flash point and delegations were invited to investigate the matter.

(b) The group agreed on having a cut-off value below 23 °C because a lower value was already used in several regulations: -18 °C (IMDG-Code), 0 °C (EC).

(c) A number of delegates indicated that any change to the lower cut-off value of -18°C currently used in the IMDG Code could have serious implications for the carriage of flammable liquids on passenger ships.

IMO was invited to investigate the consequences of such a change in detail. The IMO representative indicated that because of IMO's meeting schedule, this issue could not be considered in depth within IMO before February 1996 and therefore comments could only be made to the July 1996 Sub-Committee session.

Test methods for determination of flash points

17. The group agreed that for the determination of the flash point closed cup methods were generally to be preferred. However the use of open cup methods could also be allowed/recommended but only under special circumstances. There was no general consensus on the nature of these special circumstances and the chairman invited the delegations to make proposals on the matter for the next meeting of the group.

18. It was also agreed that the number of recommended closed cup methods should be limited to a minimum. As there is ongoing work on this subject in the ISO it was agreed to wait for the outcome of this standardization work (ISO is considering about 4-5 equivalent methods).

19. The group stressed that the harmonization of test methods should not lead to an extensive retesting of substances which might have been tested by other methods.

Definitions concerning the distinction between gases, liquids and solids

20. The group agreed that the definitions concerning the distinction between gases, liquids and solids should be harmonized. Paragraph 1.14 of the UNRTDG for distinguishing liquids from gases and paragraph 1.10 of the UNRTDG for distinguishing solids from liquids should be used in the harmonized approach.

Substances heated at or above their flash point

21. There was no consensus on the inclusion of criteria for elevated temperature substances in the harmonized approach. Some delegations felt that a harmonized system should be a system of minimal requirements and therefore these should be left out. Other delegations said that there might be a need to regulate those substances for different protection purposes. At present they are regulated in transport and it was felt that this should remain relevant for transport.

22. It was agreed that further discussions on the subject would be necessary and that the industry should provide more information especially on sectors other than transport. The question was raised whether or not substances heated upto temperatures in a range of 15 °C below their flash point should be taken into account (as currently in ADNR/ADN).

Boiling point

23. The question of the difference between boiling point and initial boiling point was raised as both terms were used in existing regulations and it was clarified that whereas for pure substances a sharply defined boiling point exists, for mixtures (such as preparations and wastes) there was no such point but a boiling range. In this case one would speak of an initial boiling point.

24. It was agreed that for the harmonized approach it would be preferable to base the criteria on the flash point only and not on the (initial) boiling point as this was more difficult to determine (see also paragraph 16 (a)).

Test and criteria on the ability of a liquid to sustain combustion

25. Provisions concerning combustion testing are currently included in the UNRTDG, IMDG-Code, ICAO TI, RID/ADR, ADNR/ADN for the purpose of assigning packing groups and including or excluding a substance from the scope of regulations.

26. A liquid is considered to be unable to sustain combustion (see paragraph 5.2 in the UNRTDG)

if

(a) it has passed a suitable combustibility test (e.g. paragraph 5.7 in the UNRTDG);
(b) its fire point according to ISO 2592:1973 is greater than 100 °C ; or
(c) it is a water miscible solution with a water content of more than 90 % by mass.

27. A substance is then excluded from the transport regulation if its flash point is higher than 35 °C and it is unable to sustain combustion (see paragraph 1.19 in the UNRTDG).

28. The EC directive 67/548/EEC also contains provisions for excluding liquid preparations/mixtures with a flash point between 21°C and 55°C from classification as flammable substances if they are unable to support combustion, but without referring to a test method. Criteria and test methods are also contained in north american regulations for storage purposes.

29. It was agreed that:

(a) combustion testing should be included in the harmonized approach for the purpose of excluding liquids from the scope of regulations;
(b) the value of 35 °C might be lowered after further investigation;
(c) the results of an ISO working group on combustion testing should be taken into account (results of that group can be expected for 1996);
(d) delegations should consult experts to investigate the matter further.

Auto ignition temperature

30. The working group took note of the existing cut-off value of 200 °C used in ADNR/ADN. It was felt that there was not enough information available at the moment to decide whether to include such a criteria in the harmonized approach or to leave it for individual organizations to decide. It was decided to come back on that matter when more information was available. Some delegations questioned whether classification criteria used for transport of dangerous goods in bulk by vessel were relevant to this harmonization effort.

Viscosity

31. It was noted that at the moment criteria using viscosity were quite complicated and mostly used in transport regulations for the purpose of assigning less stringent requirements or exempting substances from the regulations. In Germany they are also used to exempt substances from storage regulations.

32. It was agreed that:

(a) for the time being viscosity criteria should not be included in the harmonized approach but maintained in transport regulations;

(b) discussion in the relevant transport bodies was necessary to try to simplify the criteria

33. The fact that a substance can be exempted from transport regulations because of viscosity criteria but is still considered dangerous for storage purposes might lead to problems once this substance arrives unlabelled at its storage destination. It was agreed that this problem may need further discussion. Moreover if the viscosity criteria were not harmonized, some dangerous goods would be classified in different groups depending on the regulation concerned.

FLAMMABLE SOLIDS

34. The question of definitions to distinguish solids from liquids had already been dealt with in paragraph 20.

35. It was recalled that the approach favoured at the Ottawa workshop was the UN RTDG approach.

36. It was agreed for the harmonized approach:

(a) to have two hazard levels as in the UNRTDG;
(b) to use the test method currently in the UNRTDG;
(c) not to include articles that are known to ignite through friction (for transport however those articles should remain listed as flammable solids).

37. The expert from Germany felt that there was a need to increase the length of the preliminary screening test for metal powders from 20 minutes to 40 minutes (thus aligning it to the current EC system). The group was of the opinion however that the information currently available on that subject was not sufficient to justify such a change in the UNRTDG. More information about the reasons for and the implications of such a change were necessary to discuss the matter further. Germany offered to prepare a paper for the next session to supply this information.

FLAMMABLE GASES

38. In this area two different sets of criteria exist at the moment:

(a) the UNRTDG criteria (OSHA and WHMIS criteria are harmonized with the UNRTDG)

(b) the EC criteria

39. The expert from Canada gave an overview of the results of the Ottawa workshop. He pointed out that - even though a certain preference for the UNRTDG criteria for classification of flammable gases had been expressed - there was no final consensus reached.

40. The expert from the United States said that the UNRTDG criteria for classification of flammable gases had originally been developed as a workplace safety system and later been incorporated into the transport recommendations. He and several other experts were in favour of adopting the UNRTDG criteria for classification of flammable gases as the basis for the harmonized approach but no general consensus could be reached.

41. The following conclusions were reached:

(a) The safety levels existing at present for the different protection purposes should not be lowered in the harmonized approach;

(b) Further information is needed especially for the definition of hazard levels and it was felt that the gas industry should be consulted;

(c) For the question of which the expert from criteria should form the basis for the harmonized approach for flammability of gases Germany offered to prepare a paper with an overview of the benefits of the different criteria for flammable gases.

42. As far as flammability of aerosols is concerned, document ST/SG/AC.10/C.3/R.590 (United States) should remain on the agenda for the next meeting.

GASES IN GENERAL

43. With regard to compressed gases the results of the Ottawa workshop were presented. It was felt that the physical condition (compressed, liquefied, refrigerated, dissolved gases) should be taken into account. Some delegations felt that there was need for further information and therefore the discussions should be prepared for the next meeting. The expert from Germany offered to prepare a base paper.